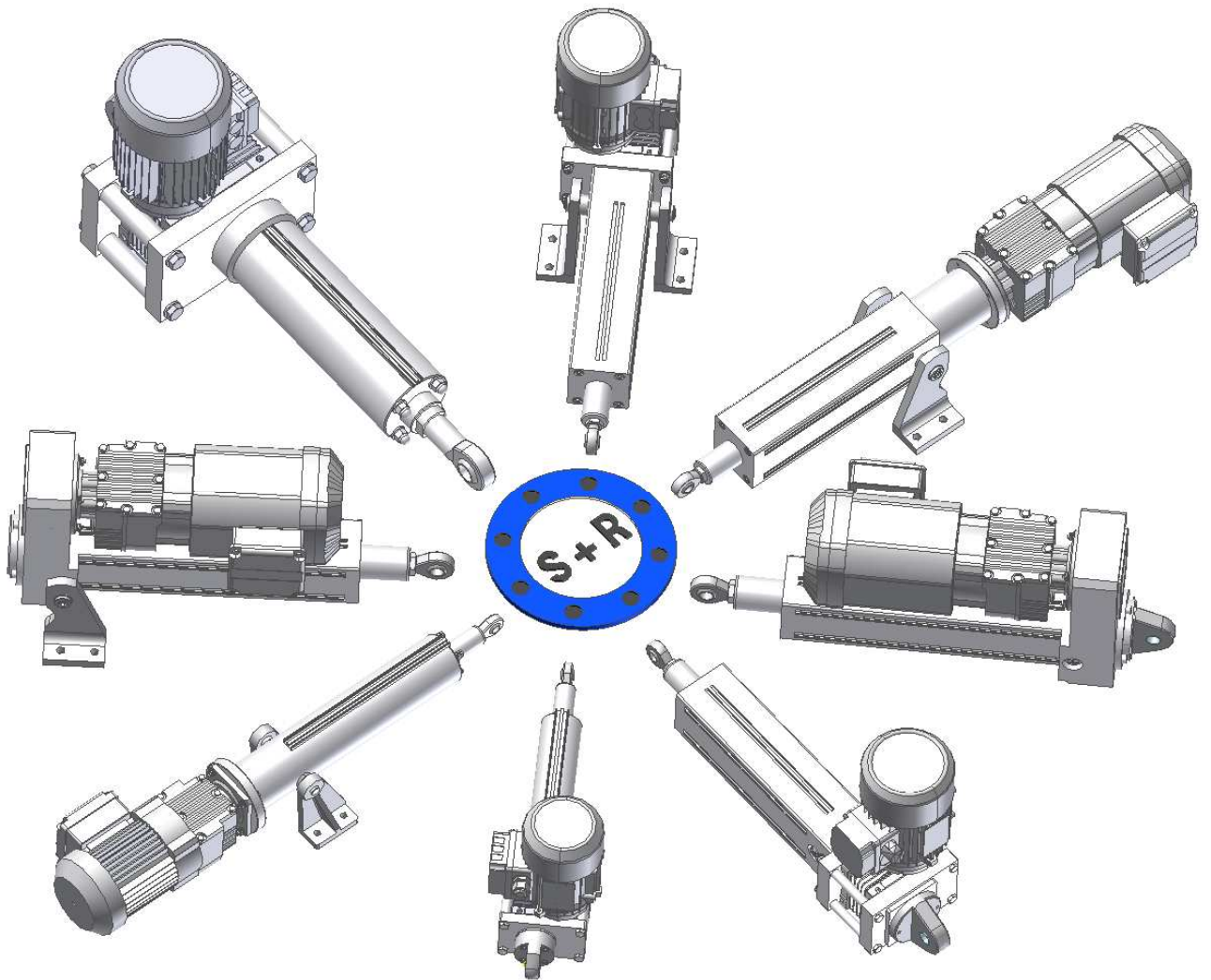
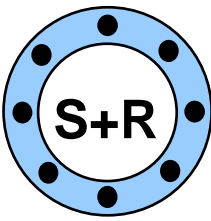


Basic Principles of Explosion Prevention





Responsibility in the Explosion-risk Area

- You get all useful information to check the correct use.
- You have to find out all the necessary criteria and properties
- The user is responsible for
 - complying with the limits of performance of the electric lifting cylinder
 - avoiding potentially explosive atmosphere
 - reducing or limiting in time the explosion risk

Explosion-risk Areas

Equipment Class

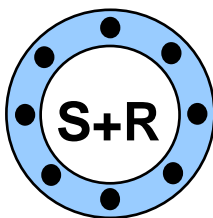
Equipment Group	Use	Remark
I	Mining	not available
II	all other appliances	available

Equipment Category

Gerätegruppe II

Category	Safety (Manufacturer)	Zone (User)
category 1 (= zone 0 / 20)	Equipment which guarantees a very high degree of safety. In case of rare malfunctions!	Intended for use in areas where an explosive atmosphere, consisting of a mixture of air and gases, vapours or dust-air-mixtures, exists permanently, for long periods of time or frequently.
category 2 (= zone 1 / 21)	Equipment which guarantees a high degree of safety. In case of malfunctions to be expected! Safety of safety	Intended for use in areas where an explosive atmosphere, consisting of a mixture of air and gases, vapours or dust-air-mixtures, exists occasionally.
category 3 (= zone 2 / 22)	Equipment which guarantees a normal degree of safety. In case of normal operation!	Intended for use in areas where an explosive atmosphere, consisting of a mixture of air and gases, vapours, fog or swirled up dust is not to be expected, but in case it does happen, then in all probability this will happen rarely and for a short period of time.

Category 2 includes category 3.



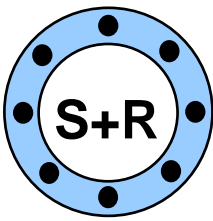
Zone Management (User)

Zones in Explosive Atmosphere		
Zone Gas	Zone Dust	probability of the occurrence of an explosive atmosphere
0	20	permanent, long-term, frequent (predominantly in time)
1	21	occasional, in normal operation
2	22	rare, short-term

Temperature Classes and Explosion Categories

Temperature Class	Max. Surface Temperature of Equipment [°C]	Max. Ignition Temperature of Combustible Substances [°C]	Explosion Category IIA	Explosion Category IIB	Explosion Category IIC
T1	450	>450	ammonia, acetone, benzene, ethane, ethyl acetate, carbon monoxide, methane, methanol, toluene, propane	coke oven gas, hydrogen gas (carburised)	hydrogen
T2	300	>200...<450	n-butane, n-butanol, cyclo-hexanone, acetic anhydride, natural gas, liquid gas	butadien-1,3, ethanol, ethylene, ethylene oxide	acetylene
T3	200	>200...<300	petrol, diesel, heating oil, jet fuel, n-hexane	petroleum, isoprene; hydrogen sulphide	
T4	135	>135...<200	acetaldehyde, ether	ethyl-ether	
T5	100	>100...<135			
T6	85	>85...<100			carbon disulphide

In case of dust explosion protection, the specification of the max. ignition temperature of the dust-air-mixture is necessary by the user.



Ignition Protection Type

of non-electric equipment for use in den in potentially explosive areas

DIN EN 13463-2	protection by flow restricting enclosure "fr"
DIN EN 13463-3	protection by flameproof enclosure "d"
DIN EN 13463-4	protection by intrinsic safety "g"
DIN EN 13463-5	protection by constructional safety "c"
DIN EN 13463-6	protection by control of ignition source "b"
DIN EN 13463-7	protection by excess pressure enclosure "p"
DIN EN 13463-8	protection by liquid immersion "k"

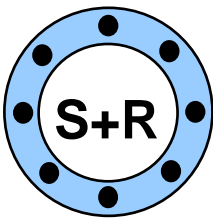
S+R electric lifting cylinders are designed for ignition protection type "c" "constructional safety". ignition protection type "b" "control of ignition source" is possible by performance control of the motor (user).

Ignition Source Analysis according to DIN EN 1127-1

It is established by ignition source analysis which ignition hazards are relevant for S+R electric lifting cylinders and with which measures the necessary safety can be reached.

The following ignition sources constitute a risk by

- hot surfaces
- mechanically generated sparks e.g. rubbing, hitting and erosion processes
- electrostatic charging
- chemical reaction
- erroneous mounting



Equipment Labelling

Exampel



II 2 G/D c T4/100°C

Ex-label

Equipment group..... II

Category..... 2

Ex-atmosphere (gas / dust)..... G/D

Ignition protection type c

Temperature class..... T4

Max. surface temperature where 5 mm dust may be deposited..... 100°C